

REMARKS

Claims 1-12 are pending in the present Application. Claim 8 has been canceled, Claim 1 has been amended, no claims have been added, and Claims 10-12 have been withdrawn, leaving Claims 1-7 and 9 for consideration upon entry of the present Amendment.

Status of Claims after Response for Restriction

Applicants acknowledge the Examiner's decision not to accept Applicant's traversal of the restriction requirements and to maintain the restriction. Accordingly, Claims 1-9, elected with traverse, are pending in part based on the election of the following species:

Formula 1: 1,1'-biphenyl-2,2'-diyl-bis(dipyrrolphosphoramidite) (BPO-P(PyI)₂)

Formula 2: triphenylphosphine oxide (TPPO)

Formula 3: acetylacetonatodicarbonylrhodium (Rh(AcAc)(CO)₂)

Claims 10-12 are withdrawn.

Amendments to Claims

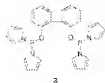
Claim 1 has further been amended to include the limitations of Claim 8, canceled herewith. No new matter has been introduced by these amendments.

Reconsideration and allowance of the claims are respectfully requested in view of the following remarks.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-9 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over *Organometallics*, **2002**, pp. 3873-3883 ("van der Slot") in view of *Journal of Molecular Catalysis A Chemical*, **2000**, pp. 1-8 ("Paganelli"). Applicants respectfully traverse this rejection.

Van der Slot discloses hydroformylation catalysts formed using Rh(acac)(CO)₂ and bis(pyrrolyl) bidentate ligand of structure 3:



having a bidentate ligand-to-rhodium ratio of 1 in NMR experiments, and 1.5 in high pressure experiments. Van der Slot, p. 3874, Scheme 1; p. 3875, LH column, first full paragraph; and RH column, last paragraph. The concentration of **3** is about 1-12 mM. Van der Slot, p. 3876, lower LH column. Monodentate ligands (instead of bidentate ligands of **3**) are disclosed as prior art in van der Slot, where these ligands give rise to a mixture of isomers $\text{HRhL}_2(\text{CO})_2$ and $\text{HRhL}_3(\text{CO})$ (where monodentate ligand L is triphenyl phosphine or triphenyl phosphite). der Slot, p. 3874, Scheme 1; p. 3875, LH column, first full paragraph.

Paganelli discloses rhodium complex $\text{Rh}(\text{CO})_2(\text{acac})$ and TPPO, where TPPO is triphenylphosphite. Paganelli, p. 3, Table 1, entries 3 and 4; Table 1, footnote “c” (“triphenylphosphite”), and p. 3, first full paragraph.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, or knowledge generally available in the art at the time of the invention, must provide some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). “A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). To find obviousness, the Examiner must “identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does.” *Id.*

Claim 1, based on the election of species filed February 19, 2008, claims a catalyst comprising:

Formula 1: 1,1'-biphenyl-2,2'-diyl-bis(dipyrrolphosphoramidite) (BPO-P(PyL)_2)

Formula 2: triphenylphosphine oxide (TPPO) (emphasis added)

Formula 3: acetylacetonatodicarbonylrhodium ($\text{Rh}(\text{AcAc})(\text{CO})_2$).

Van der Slot discloses triphenylphosphine and triphenylphosphite, but does not disclose use of triphenylphosphine oxide (Applicant’s “TPPO”). Paganelli discloses rhodium complexes that

may contain triphenylphosphite (Paganelli's "TPPO"). One skilled in the art will appreciate the difference between a triphenyl phosphine oxide, in which the phosphorus atom is oxidized through the phosphorus lone pair to have an oxygen atom bonded to it (to provide structure $\text{Ph}_3\text{P}=\text{O}$, consistent with Applicants general formula (2) in Claim 1), in contrast to a triphenylphosphite in which three $\text{PhO}-$ ligands are bonded to a phosphorus atom having a lone pair (to provide the structure $(\text{PhO})_3\text{P}$), and hence will appreciate that these compounds are not identical. For this reason at least, the combination of Van der Slot and Paganelli does not teach or disclose all elements of the instant Claims, and therefore does not provide a prima-facie case of obviousness.

Further, even if the TPPO of Applicant's Claims were taught in Paganelli, there would be no reasonable expectation for success as the field involved is catalysts. The Examiner's rejection is based on the premise that "the motivation to combine the references is that since TPPO[Note: according to Applicant's disclosure and not Paganelli's] and rhodium is a viable hydroformylation catalyst, it would make sense to one of skill in the art to try to add TPPO to the catalyst of van der Slot et al. to create a new catalyst composition." Office Action dated March 28, 2008, p. 4, lines 7-12. Courts have recognized that this premise cannot fairly be applied to the field of catalysis. For example, in *Corona Cord Tire*, the Supreme Court recognized that such a generalization is inappropriate in unpredictable fields such as catalysis. The mere fact that a known compound is a catalyst does not render obvious later discovered catalytic activity of a distinctly different compound notwithstanding close structural similarity: "catalytic action [] cannot be forecast by chemical composition, for such action is not understood and is not known except by actual test." *Corona Cord Tire Co. v. Dovan Chemical Corp.*, 276 U.S. 358, 369 (1928).

This holding continues to be recognized and amplified.

The conclusion that [applicants'] invention would have been nonobvious to one having ordinary skill in the art on the basis of the cited art is [] buttressed by the fact that the claimed invention is a catalytic process. The unpredictability of catalytic phenomena has been recognized. . . [A] successfully catalyzed process depends not only on the particular catalyst that may be employed but also on the environment within which the catalysis is accomplished. . . The adequacy of any showing of equivalency must be scrutinized especially carefully where it is alleged to have been obvious to substitute one starting material for another in a *catalytic* process.

In re Mercier, 515 F.2d 1161, 185 U.S.P.Q. 774, 779-80 (C.C.P.A. 1975). Because structural similarity is such a poor indicator of performance in the field of catalysis, Applicants respectfully submit that the Examiner has failed to make out a *prima facie* case of obviousness. Therefore, Applicants respectfully request that the rejection be reconsidered and withdrawn.

Claim 1 has further been amended to include the limitations of Claim 8, canceled herewith. By the amendment of Claim 1, the concentration of each of the components of the composition is limited to the claimed ranges. Paganelli and van der Slot do not disclose all the ranges of the claimed catalyst components, and in particular, do not disclose the amount of monodentate ligand (triphenylphosphine oxide).

It is disclosed in the instant Specification on p. 6, lines 4-10, that the transition metal is present at 50-500 ppm, where less than 50 ppm of the transition metal produces a reaction rate that is undesirably low, and that increasing the catalyst quantity becomes too costly in Applicants process, and furthermore, no additional benefit in increased reaction rate is obtained by metal concentrations greater than 500 ppm.

It is also disclosed in the instant Specification on p. 6, lines 20-30, that the bidentate ligand (e.g., BPO-(P(PYL)₂)) is present at 0.5 to 20 mol, and the monodentate ligand (e.g., TPPO, triphenylphosphine oxide) is present at 0.1 to 200 mol, each per mole of transition metal (e.g., Rh(acac)(CO)₂). Stability of the catalyst is reduced where the quantity of bidentate ligand is less than 0.5 mol, and where the transition metal is more than 20 mol, catalytic activity may be reduced significantly. Also, if the ratio of monodentate ligand to Rh metal is less than 0.1, there is no increased catalytic activity, and if greater than 200, there catalyst is not economical. Neither van der Slot nor Paganelli discloses the limitations or the consequences of working outside of the ranges, particularly with regard to the monodentate ligand. For this reason, even assuming van der Slot and Paganelli taught all catalyst components, which the combination does not, there would be no suggestion or incentive that would motivate one skilled in the art to select the claimed ranges for each component, or with a reasonable expectation that the ranges would be successful.

Therefore, the combination of van der Slot and Paganelli fail to teach all elements of

the instant claims, fail to provide a suggestion or incentive that would motivate one skilled in the art to modify the combination of van der Slot and Paganelli to include triphenylphosphine oxide or the claimed ranges, and further provides no reasonable expectation that the combination would be successful. The combination of van der Slot and Paganelli thus fails to render the instant claims unpatentable. Reconsideration and allowance are respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

CANTOR COLBURN LLP

By: /Dana A. Gronbeck/
Dana A. Gronbeck
Registration No. 55,226
Confirmation No. 7001
CANTOR COLBURN LLP
20 Church Street, 22nd Floor
Hartford, CT 06103
Telephone (860) 286-2929
Facsimile (860) 286-0115
Customer No.: 23413

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